

CLAIMS

I claim:

- [c1] 1. An image sensor comprising:
 a plurality of pixels formed in a semiconductor substrate, each pixel including a light sensitive element;
 a micro-lens over each of said light sensitive elements; and
 a trench structure surrounding each of said micro-lenses.
- [c2] 2. The image sensor of Claim 1 wherein said trench structure is circular.
- [c3] 3. The image sensor of Claim 1 wherein said trench structure has a rectangular cross-section.
- [c4] 4. The image sensor of Claim 1 wherein the micro-lenses are formed from polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).
- [c5] 5. The image sensor of Claim 1 wherein said trench structure has a depth on the order of 0.2 microns.
- [c6] 6. The image sensor of Claim 1 wherein said trench structure is formed in a layer that underlies said micro-lenses.

- [c7] 7. The image sensor of Claim 1 further including a color filter layer between said micro-lenses and said light sensitive elements.
- [c8] 8. A pixel of an image sensor comprising:
 a light sensitive element formed in a semiconductor substrate;
 a micro-lens over said light sensitive element; and
 a trench structure surrounding said micro-lens.
- [c9] 9. The pixel of Claim 8 wherein said trench structure is circular.
- [c10] 10. The pixel of Claim 8 wherein said trench structure has a rectangular cross-section.
- [c11] 11. The pixel of Claim 8 wherein the micro-lens is formed from polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).
- [c12] 12. The pixel of Claim 8 wherein said trench structure has a depth on the order of 0.2 microns.
- [c13] 13. The pixel of Claim 8 wherein said trench structure is formed in the material that underlies said micro-lenses.
- [c14] 14. The pixel of Claim 8 further including a color filter layer between said micro-lenses and said light sensitive elements.

- [c15] 15. A method of forming a pixel of an image sensor comprising:
 forming a light sensitive element in a semiconductor substrate;
 forming a top planarizing layer over said light sensitive element;
 forming a trench structure in said top planarizing layer, said trench structure
 encompassing said light sensitive element; and
 forming a microlens within the interior of said trench structure and over said light
 sensitive element.
- [c16] 16. The method of Claim 15 wherein said trench structure is formed in said top
 planarizing layer.
- [c17] 17. The method of Claim 15 wherein said trench structure has a rectangular
 cross section.
- [c18] 18. The method of Claim 15 wherein said trench structure is a closed shape.
- [c19] 19. The method of Claim 15 further including forming a color filter layer
 between said microlens and said light sensitive element.